

What is claimed is:

1. An optoelectronic apparatus comprising:
a substrate having a stepped surface;
a thermal electric cooler disposed on a lower portion of the stepped surface of the substrate; and
a laser light source disposed on the thermal electric cooler.
2. The optoelectronic apparatus of claim 1, wherein the substrate comprises a ceramic material.
3. The optoelectronic apparatus of claim 1, wherein the ceramic material comprises a selected one of aluminum nitride, alumina, and beryllium oxide.
4. The optoelectronic apparatus of claim 1, wherein the substrate comprises a plurality of vias to facilitate routing of electrical connections to the thermal electric cooler.
5. The optoelectronic apparatus of claim 1, wherein the thermal electric cooler comprises a T-shaped bottom portion.
6. The optoelectronic apparatus of claim 1, wherein the apparatus further comprises a selected one of a driver and an amplifier disposed on an upper portion of the stepped surface of the substrate, and coupled to the laser light source.
7. The optoelectronic apparatus of claim 6, wherein the substrate comprises a plurality of vias to facilitate routing of electrical connections to the selected one of the driver and the amplifier.
8. The optoelectronic apparatus of claim 1, wherein the laser light source comprises a selected one of a vertical cavity surface-emitting laser device, a Fabry-Perot laser

device, a distributed feedback laser device, and a laser diode device.

9. The optoelectronic apparatus of claim 1, wherein the apparatus further comprises a laser light steering mirror subassembly disposed on the thermal electric cooler, adjacent to the laser light source.

10. The optoelectronic apparatus of claim 1, wherein the apparatus further comprises an overhanged welding ring disposed around the substrate.

11. The optoelectronic apparatus of claim 1, wherein the apparatus further comprises a cap with an optical window to cover the laser light source and the thermal electric cooler.

12. The optoelectronic apparatus of claim 11, wherein the optical window comprises a selected one of a flat glass window, a ball lens, an aspherical lens or a GRIN lens.

13. A method comprising:

emitting laser light from an enclosed environment employing a laser light source device disposed within the enclosed environment;

cooling the laser light source employing a thermal electric cooler disposed within the enclosed environment, and

dissipating thermal energy from the thermal electric cooler through a substrate that is at least partially disposed within the enclosed environment, and dissipating thermoelectricity from the thermal electric cooler through electrical connections disposed in first plurality of vias of the substrate.

14. The method of claim 13, wherein

the substrate comprises a stepped surface having a lower portion and a higher portion; and

the thermal electric cooler is disposed on the lower portion of the stepped surface, resulting in said dissipating of the thermal energy and thermoelectricity being effectuated

through the lower portion of the stepped surface.

15. The method of claim 14, wherein the method further comprises providing electrical signals to a selected one of the laser light source, a driver coupled to the laser light source, and an amplifier coupled to the laser light source, through a second plurality of vias of said substrate and said higher portion of the substrate.

16. A system comprising:

- a data routing subsystem including memory having a plurality of data routing rules, and a processor coupled to the memory to route data based at least in part on the data routing rules; and

- a networking interface coupled to the data routing subsystem to optically receive and forward data for the data routing subsystem, the networking interface having an optoelectronic module including

- a substrate having a stepped surface;

- a thermal electric cooler disposed on a lower portion of the stepped surface of the substrate; and

- a laser light source disposed on the thermal electric cooler.

17. The system of claim 16, wherein the substrate of the optoelectronic module comprises a plurality of vias to facilitate routing of electrical connections to the thermal electric cooler.

18. The system of claim 16, wherein the thermal electric cooler of the optoelectronic module comprises a T-shaped bottom portion.

19. The system of claim 16, wherein the optoelectronic module further comprises a selected one of a driver and an amplifier disposed on an upper portion of the stepped surface of the substrate, and coupled to the laser light source.

20. The system of claim 19, wherein the substrate of the optoelectronic module

comprises a plurality of vias to facilitate routing of electrical connections to the selected one of the driver and the amplifier.

21. The system of claim 16, wherein the optoelectronic module further comprises an overhanged welding ring disposed around the substrate.

22. The system of claim 16, wherein the optoelectronic module further comprises a cap with an optical window to cover the laser light source and the thermal electric cooler.